DEVELOPMENTALLY APPROPRIATE TECHNOLOGY PRACTICE: EXPLORING MYTHS AND PERCEPTIONS OF EARLY CHILDHOOD AND INSTRUCTIONAL TECHNOLOGY PROFESSIONALS

By

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ABSTRACT

The integration of technology in early childhood classrooms has become a controversial issue among professionals in this field. One issue which may influence technology in these classrooms may be perceptions of what is developmentally appropriate practice (DAP). This paper explores perceptions about technology and age appropriate recommendations for young children based on results of a survey answered by Instructional Design and Technology (IDT) and Early Childhood Education (ECE) professionals. This paper provides a starting point to counteract the many misconceptions these teachers have about what constitutes developmentally appropriate practice for young children in relation to technology in early childhood education classrooms and discusses some of the contradictions between professionals.

Keywords: Early Childhood, Technology, DAP, Teacher Beliefs, Technology Myths.

INTRODUCTION

> "*People who thought that the question about technology in education was whether there should be a computer in every classroom have had their eyes opened to the idea that something much bigger is at stake.*"
>
> *–Seymour Papert (2000).*

Early Childhood Education and Technology: A Need for New Frameworks

The learning opportunities and expectations for young children are dramatically different in this age of technology. There was a time when teachers and textbooks were the communicators and filters of knowledge, but now much of the world's knowledge is accessible to any student who can turn on a computer and log in to the internet (Renzulli, 2007). The role of technology in early childhood environments has been and is still under debate. The National Center for Education Statistics (2003) conducted an early childhood longitudinal study on computer access at home and at school. Results indicate that in only one year, from 1999 to 2000, Internet access increased from 49% to 60% for home access and from 75% to 92% for school and classroom access. Considering the rapid development and decrease in cost of technology within the 10 years that have passed since this survey was conducted, virtually every home and classroom in the United States has computer and other types of technology access (Spatariu, Peach, & Bell, in press). Technology is available to and impacts all aspects of the lives of young children and their teachers.

Possible influences on ECE Professionals

One controversy in early childhood education comes from the perceived theoretical basis for the field which identifies *Developmentally Appropriate Practice* (DAP) as the underlying conceptual framework for practice. DAP has been associated with what practitioners identify as *age appropriate* teaching in early childhood environments. This term comes from their interpretation of the work of Jean Piaget and his identification of developing cognitive maturation levels. Piaget's research identified levels of thinking that evolved as children developed and in no way identified teaching practices or recommended systems of

educational programs. DAP is accepted as research-based by early childhood educators because of the connection to Piaget. There is very limited empirical evidence that this interpretation of Piaget's theories supports the use of DAP for teaching practice. There have been heated discussions even among early childhood educators in the past several decades regarding some guidelines published by the National Association for the Education of Young Children that relate to Developmentally Appropriate Practices. The term "developmental" is ubiquitous in early childhood and is consistent with the field's long history that stresses the importance of understanding children's development first and foremost (Winsor, 2006). Lee & Johnson (2007) argue that the field has maintained an allegiance to outdated and limited developmental theories that require updating and broadening. Some literature that would argue that Piaget underestimated young children and believe that children's ways of thinking are more sophisticated and complex than initially theorized (Flavell & Miller, 1998; Wellman, Cross, & Watson, 2001).

Another possible influence on understanding of age appropriate technology use comes from some professional organizations in the field of ECE. In a report titled "Fool's Gold: A Critical Look at Computers in Childhood" by the Alliance for Childhood (2000), an international group of educators, physicians, and others who are concerned about the current environment for children identify concerns about computer use with young children in general which relate to instruction and assessment. Editors Cordes and Miller take a strong stand against computer use with young children, as technology in American classrooms is regarded as a contributing factor for repetitive stress injuries, attention deficit disorder, and even obesity while diverting resources from other priorities identified in the report. Among the many specific concerns raised regarding computer instruction with young children are threats to physical development and health. They wrote that young children are at greater risk of injury because their bones, tendons, nerves, muscles and soft tissue are growing, and that computers will contribute to childhood obesity due to the sedentary and passive nature of human-computer interaction. Social and emotional developments were predicted to be damaged due to lack of social interactions with humans. Another concern from this report claims that the decreasing face-to-face interaction with humans will damage societal interactions causing an increase in crime and decrease in empathy. An increased use of computers for instruction may create an imbalance among the traditional components of child development which early childhood professionals believe are necessary for mental health. Claims that intellectual and creative development will be damaged by use of computers with young children are supported in this report. This report paints an ominous picture of negative effects in all areas of child development and implies that technology use for instruction and assessment may actually hurt children's development. A question exemplifying the Alliance's concerns and stance is, "Must five-year-olds be trained on computers today to get the high-paying jobs of tomorrow?" which is later answered by the assertion that "the technology in schools today will be obsolete long before five-year-olds graduate;" the central focal point of their stance is encapsulated in the following pronouncement: "Those who place their faith in technology to solve the problems of education should look more deeply into the needs of children" (Cordes & Miller, 1999, p.4). Reports like this often influence the use of technology in ECE classrooms and are the basis for many myths associated with developmental issues in early childhood environments.

Research supports that teachers develop their instructional decisions through knowledge, skills, attitudes, and values they agree are important and this influences what they nurture in their students. There is a growing interest in the role of epistemic beliefs in learning and academic achievement. Epistemic beliefs refer to beliefs about knowledge (including IDTs structure and certainty) and knowing (including sources and justification of knowledge) (Buehl & Alexander, 2005; Duell & Schommer-Aikins, 2001; Hofer, 2000; Hofer & Pintrich, 2002). In particular, these can include beliefs about "the definition of knowledge, how knowledge is constructed, how knowledge is evaluated, where knowledge resides, and how knowing occurs" (Hofer, 2001, p. 355). Research supports that teachers develop their instructional decisions through knowledge, skills,

attitudes, and values they agree are important and this influences what they nurture in their students. With increased recognition of the intellectual capacities of young children (3- and 4-year-olds), as well as a growing understanding of how these capacities develop can be fostered, has come a growing recognition that early childhood education, in both formal and informal settings, may not be helping children maximize their cognitive capacities (National Research Council, NRC, 2001). Three reports from the National Academies address different aspects of education for very young children from a variety of prospects (NRC, 2001). *From Neurons to Neighborhoods: The Science of Early Childhood Development* (National Research Council and Institute of Medicine, 2000) provides a detailed look at the many factors that influence development in very young children. *Eager To Learn: Education Our Preschoolers* (NRC, 2001a) describes the current status of the programs in which young children are educated, setting that description in the context of recent contributions from the field of cognitive science. *Adding IDT Up: Helping Children Learn Mathematics* (NRC, 2001) closely examines mathematics learning and describes IDTs facets. Each of these reports contributes to an evolving base of evidence that the early learning programs to which students are exposed are extremely important (NRC, 2005).

Domain specific areas in education; such as, science and technology have long been given minimal attention in early childhood programs and training. The learning and development of young children has recently taken on new importance. Private and government organizations are developing programs to enhance the school readiness of all young children, especially children from economically disadvantaged homes and communities and children with special needs (NRC 2008). Education policies, starting with the common school and continuing through the No Child Left Behind Act of 2001, have been designed to ensure adequate accomplishments in particular domains; reading and mathematics are almost always included, but science, technology, history, literature, art, music, and athletics receive more intermittent and contested support (National Academies Press, 2008). Professional organizations like the National Association for the Education of Young Children (NAEYC) and the National Research Council (NRC) recognize and endorse the growing attention to the need to integrate technology in early childhood in addition to the traditional domains of language, literacy, and mathematics. The problem in science and technology is the paucity of research-based information and assessment approaches with young children (National Academies Press 2008).

There is a gap between the increasing use and role of technology and the acceptance of technology in early childhood practice. This study investigates the perceptions and recommendations of professionals working in the Instructional Technology and Early Childhood Education fields in relation to age appropriate use of specified technology.

Research Question

What technology tools are considered age appropriate for very young and young children?

Theoretical Framework

The framework used for our approach incorporates perceptions between early childhood and instructional technology practitioners and their views of what is and is not appropriate technology for young children. The basis for Developmentally Appropriate Practice in early childhood settings comes from the personal interpretation of Piaget's theories of development by teachers and faculty. To understand the expectations and perceptions of what this means in technology, the framework focuses on the perceptions of professionals from two fields to better understand how technology use for young children is perceived. Professionals work in a limited realm dependent on their field and interpretations of experiences and perceptions of development. This paper discusses how perceptions from two fields may influence the use of technology in informal and formal settings with young children and suggest our interpretation, as well as implications from this research on teaching and learning. Operationally, the perceptions may be in conflict with what is considered developmentally appropriate practice. In doing this, this work addresses many of the issues present in the research that call for improved frameworks of teaching and learning for the child and the teacher (e.g., Burman,

1994; Cannella, 1997; Grieshaber, 2005).

Method

Participants

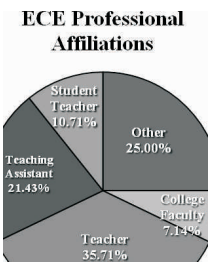
The sample for this study came from two groups of professionals, Instructional Technology and Early Childhood Educators. The sample was self selected as a survey which was posted on web sites of professional organizations associated with these two groups and e-mailed to list serves. Participation was voluntary. There were 135 responses from the IDT professionals and 28 from the ECE professionals. In order to account for the drastic difference in the number of participants from each group, responses from 28 IDT professionals were randomly selected in order to assure that the sample size matched for each group. The total number of responses evaluated in this study was 56 (28 ECE professionals and 28 IDT professionals). Participants included professionals at varying levels including teachers, student teachers, teaching assistants, college faculty and IDT professionals in the private sector. Following is a more detailed breakdown of the categories of professionals in each group (Figure1 and Figure 2).

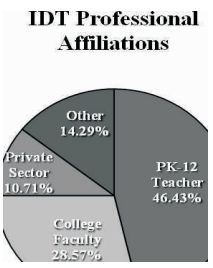
Materials and Procedures

A survey identifying types of popular technology was sent to professional groups in both IDT and ECE that requested a selection of popular technology tools by age grouping of child that included 5 options about technology and education. Responses were submitted through Survey Monkey software to maintain anonymity.

Assessments and Measures

Appropriate ages for technology use. Each group of participants was asked to identify at what age group specified technology tools would be appropriate for use across five groups (Appendix A for a complete list of questions used for this study).





Figures 1 and 2. Categories of professional background for ECE and IDT professionals

Survey Section

Participants were asked to indicate their judgment on the appropriate ages for children to use various technologies. The choices were: Very Young Children (Ages 2-4); Young Children (Ages 5-8); Elementary (Ages 9-12); Middle School (Ages 13-15); and High School (15 and over).

Survey question

Participants were asked to indicate what age group they judged children should be allowed to use different forms of technology. Each technology category included check boxes listing each age group horizontally. Table 1 lists the specific types of technology for which participants made their judgments (we realize that some of these categories may be somewhat indistinct due to emerging technologies):

Results

In order to establish what age range IDT and ECE professionals considered appropriate for children to use technology percentage of participant responses were calculated for each group of professionals (ECE and IDT) and for each age range (Very Young Children, Young Children, Elementary, Middle and High School) (Table 2 and Figure 3).

Overall, participant responses suggested that less than 50% of both ECE and IDT professionals think technology is appropriate for use by children under the age of 15 (High School Age). Furthermore, overall results indicate that less than 50% percent of the participants considered

List of Technologies Evaluated	
Computers w/standalone software programs/CDs	Internet Role-playing/Simulation (2nd Life, Virtual Worlds, etc.)
Computers w/Internet-based/ online programs	Web 2.0/Social Networking (Facebook, YouTube, Twitter, etc.)
Computer-based Games (standalone, CD-based)	iPod/MP3 Player
Internet-accessible Games (Halo, World of Warcraft, etc.)	Digital Still Cameras
Hand-held Video Games (PSP, Nintendo, etc.)	Digital Video Cameras
TV-dependent Video Games (Nintendo, XBox, PlayStation, etc.)	Cell phones
CD-based Role-playing/Simulation (Civilization, Sims, etc.)	E-mail

Table 1. List of technologies for which participants made appropriateness judgments

Age Range	IDT	ECE	Overall
Very Young Children	10.46	11.22	10.84
Young Children	18.62	18.88	18.75
Elementary	33.63	35.71	34.67
Middle School	45.91	46.68	46.30
High School	59.69	56.63	58.16
Overall	28.87	28.53	28.70

Table 2. Percentages of participants who judged technology-use as appropriate

technology use appropriate for children ages 2 and up. More specifically, participant responses suggested that a small percentage (i.e., less than 20%) of both ECE and IDT professionals considered technology use appropriate for children ages 2-8.

In order to better understand which specific technologies ECE and IDT professionals considered appropriate for children to use, percentages of participants who judged

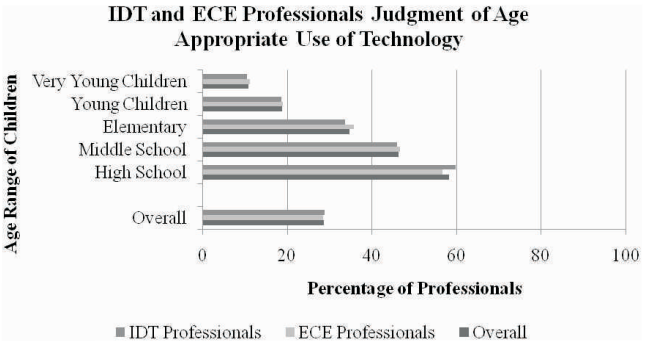


Figure 3. Percentages of participants who judged technology-use as appropriate

the technologies as appropriate were calculated for each group of professionals for 14 different technologies (Table 3,4). Following is a table that includes percentages of both ECE and IDT professionals who considered the specific

	Very Young Children		Young Children		Elementary		Middle School		High School	
Technology Item	N	%	N	%	N	%	N	%	N	%
Computers w/standalone software programs/CDs	11	39.29	15	53.57	17	60.71	13	46.43	13	46.43
Computers w/Internet-based/online programs	4	14.29	11	39.29	14	50.00	14	50.00	15	53.57
Computer-based Games	9	32.14	13	46.43	15	53.57	13	46.43	15	53.57
Internet-accessible Games	1	3.57	2	7.14	7	25.00	12	42.86	18	64.29
Hand-held Video Games	3	10.71	5	17.86	14	50.00	13	46.43	16	57.14
TV-dependent Video Games	2	7.14	6	21.43	14	50.00	13	46.43	16	57.14
CD-based Role-playing/Simulation	1	3.57	2	7.14	11	39.29	13	46.43	16	57.14
Internet Role-playing/Simulation	1	3.57	2	7.14	6	21.43	13	46.43	17	60.71
Web 2.0/Social Networking	0	0.00	0	0.00	2	7.14	6	21.43	22	78.57
iPod/MP3 Player	1	3.57	5	17.86	11	39.29	17	60.71	13	46.43
Digital Still Cameras	4	14.29	6	21.43	14	50.00	15	53.57	14	50.00
Digital Video Cameras	3	10.71	3	10.71	9	32.14	14	50.00	15	53.57
Cell Phones	2	7.14	2	7.14	3	10.71	14	50.00	16	57.14
E-mail	2	7.14	2	7.14	3	10.71	13	46.43	16	57.14

Table 3. Percentage of ECE Professionals who Judged Specific Technologies as Appropriate for Children Ages 2 and up

	Very Young Children		Young Children		Elementary		Middle School		High School	
Technology Item	N	%	N	%	N	%	N	%	N	%
Computers w/standalone software programs/CDs	10	35.71	11	39.29	15	53.57	14	50.00	14	50.00
Computers w/Internet-based/online programs	3	10.71	8	28.57	15	53.57	13	46.43	15	53.57
Computer-based Games	9	32.14	9	32.14	16	57.14	13	46.43	15	53.57
Internet-accessible Games	3	10.71	5	17.86	4	14.29	14	50.00	16	57.14
Hand-held Video Games	2	7.14	6	21.43	17	60.71	15	53.57	15	53.57
TV-dependent Video Games	3	10.71	8	28.57	16	57.14	14	50.00	16	57.14
CD-based Role-playing/Simulation	1	3.57	4	14.29	6	21.43	12	42.86	17	60.71
Internet Role-playing/Simulation	1	3.57	2	7.14	5	17.86	9	32.14	18	64.29
Web 2.0/Social Networking	1	3.57	1	3.57	2	7.14	4	14.29	22	78.57
iPod/MP3 Player	2	7.14	3	10.71	13	46.43	13	46.43	17	60.71
Digital Still Cameras	3	10.71	7	25.00	14	50.00	14	50.00	18	64.29
Digital Video Cameras	1	3.57	5	17.86	8	28.57	13	46.43	17	60.71
Cell Phones	1	3.57	2	7.14	5	17.86	15	53.57	17	60.71
E-mail	1	3.57	2	7.14	7	25.00	17	60.71	17	60.71

Table 4. Percentage of IDT Professionals who Judged Specific Technologies as Appropriate for Children Ages 2 and up

technologies appropriate for the different age ranges (Tables 3-4 and Figures 4-11).

Overall, responses suggested that participants have varying judgments about the appropriateness of technology use depending on the type of technology. It would, therefore, be beneficial to consider ECE and IDT professionals' judgments for certain types of technology from the above list. In the following sections these data are considered along three dimensions: basic computing functions, entertainment, and social impacts. Figures 4-11 address each of the types of technology individually.

Basic Computing Functions

For the purposes of this study we looked at ECE and IDT professionals' judgments across 14 different types of technology. In order to better organize the discussion, the authors collapsed the different types of technology into 3 groups (basic computing functions, entertainment, and social). The category of basic computing functions includes the technologies of computers with standalone programs or CDs and computers with internet-based or online programs.

In comparison to IDT professionals, a higher percentage of ECE professionals agree that computers with standalone software programs or CDs are appropriate for children ages 2-12. However, for children 12 and up, a higher percentage of IDT professionals agree that this technology is appropriate (Tables 3,4 and Figure 4).

In comparison to IDT professionals, a higher percentage of ECE professionals agree that computers with internet-based or online programs are appropriate for children ages 2-8 as well as children 13-15. However, for children from ages 9-12, a higher percentage of IDT professionals agree that this technology is appropriate. The same percentage of ECE and IDT professionals agree that this technology is appropriate for children ages 15 and above (Tables 3,4 and Figure 5). It is especially important to note that less than 20% of both ECE and IDT professionals found this technology to be appropriate for children ages 2-4.

Entertainment

In order to better represent the data the authors present it focusing on three categories.The entertainment category includes internet-accessible games, hand held video games, and iPods/mp3 players.

In comparison to IDT professionals, a higher percentage of ECE professionals agree that internet-accessible games are appropriate for children ages 9-12 and children ages 15 and above. However, for children from ages 2-8 and children ages 13-15, a higher percentage of IDT professionals agree that this technology is appropriate (Tables 3 and 4). It is important to note that less than 20% of both ECE and IDT professionals judged internet-accessible games as appropriate for children ages 2-8 (Figure 6).

In comparison to IDT professionals, a higher percentage of

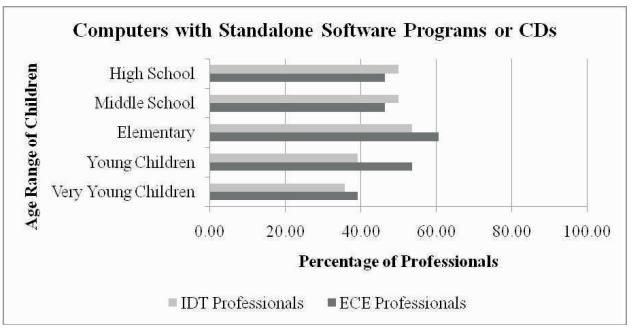


Figure 4. Percentage of ECE and IDT professionals who indicated that computers with standalone software programs were appropriate for children

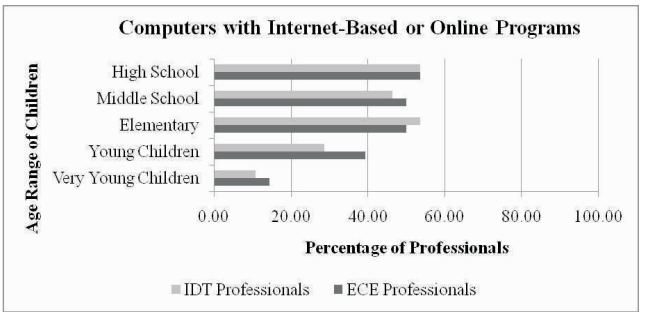


Figure 5. Percentage of ECE and IDT professionals who indicated that computers with internet-based or online programs were appropriate for children

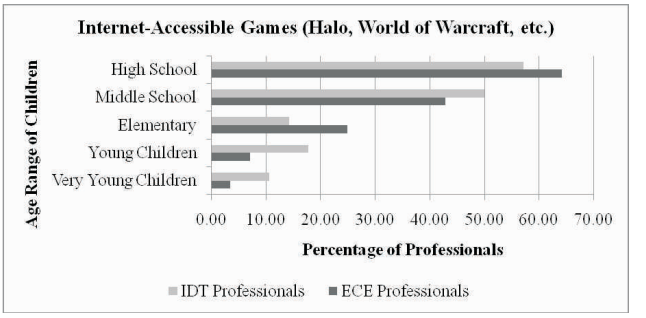


Figure 6. Percentage of ECE and IDT professionals who indicated that internet-accessible games were appropriate for children

ECE professionals agree that hand-held video games are appropriate for children ages 2-4 and children ages 15 and above. However, for children from ages 5-15, a higher percentage of IDT professionals agree that this technology is appropriate (Tables 3 and 4). It is important to note that less than or nearly equal to 20% of both ECE and IDT professionals judged hand-held video game use as appropriate for children age 2-8 (Figure 7).

In comparison to IDT professionals, a higher percentage of ECE professionals agree that iPods/mp3 players are appropriate for children ages 5-8 and children ages 13-15. However, for children from ages 2-4, 9-12, and 15 and up a higher percentage of IDT professionals agree that this technology is appropriate (Tables 3 and 4). It is important to note that less 20% of both ECE and IDT professionals judge iPods/mp3 players as appropriate for children age 2-8 (Figure 8).

Social

In order to better represent the data we will present it focusing on three categories. The social category includes web 2.0/social networking, cell phones and e-mail.

In comparison to IDT professionals, a higher percentage of ECE professionals agree that social networking is appropriate for children ages 13-15. However, for children from ages 2-8 a higher percentage of IDT professionals agree that this technology is appropriate. The same percentage of ECE and IDT professionals agree that social networking is appropriate for children ages 15 and up (Tables 3 and 4). It is important to note that less 20% of IDT professionals judged social networking as appropriate for children age 2-8. However, it is also important to note that there were no ECE professionals who judged social networking as being an appropriate use of technology for children ages 2-8 (Figure 9).

In comparison to IDT professionals, a higher percentage of ECE professionals agree that cell phone use is appropriate for children ages 2-4. For children ages 5-8 the same percentage of ECE and IDT professionals agree that this technology is appropriate. However, for children from ages 9 and up a higher percentage of IDT professionals agree that this technology is appropriate (Tables 3 and 4). It is important to note that less 20% of IDT professionals judged cell phones as appropriate for children age 2-8 (Figure 10).

In comparison to IDT professionals, a higher percentage of ECE professionals agree that e-mail use is appropriate for children ages 2-4. For children ages 5-8 the same percentage of ECE and IDT professionals agree that this

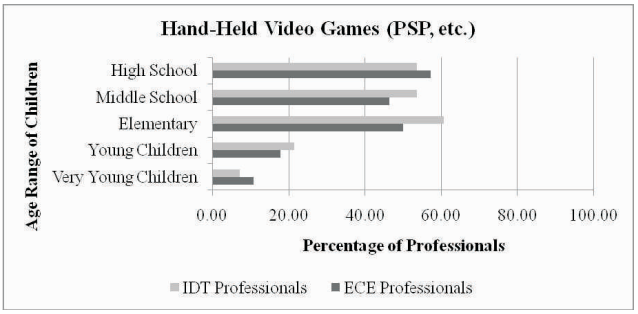


Figure 7. Percentage of ECE and IDT professionals who indicated that handheld video games were appropriate for children

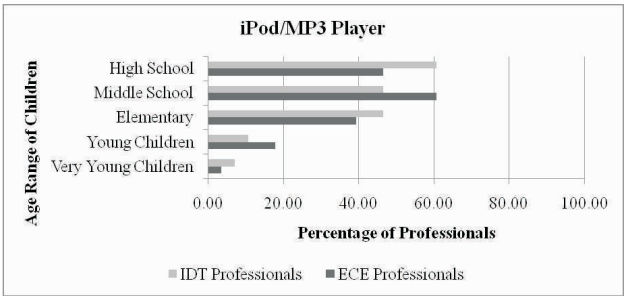


Figure 8. Percentage of ECE and IDT professionals who indicated that iPods/mp3 players were appropriate for children

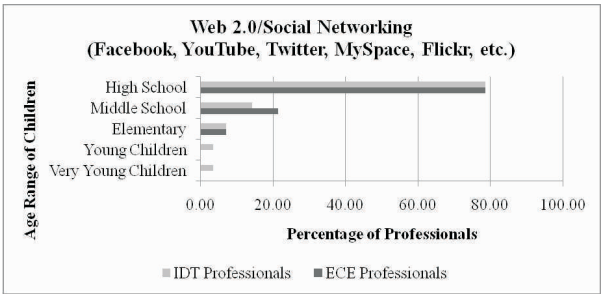


Figure 9. Percentage of ECE and IDT professionals who indicated that social networking was appropriate for children

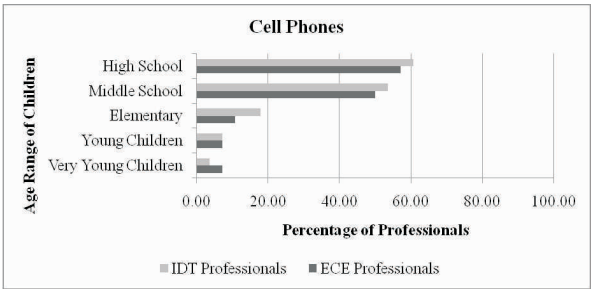


Figure 10. Percentage of ECE and IDT professionals who indicated that cell phones were appropriate for children

technology is appropriate. However, for children from ages 9 and up a higher percentage of IDT professionals agree that this technology is appropriate (Tables 3 and 4). Again, it is important to note that less 20% of both ECE and IDT professionals judged e-mail use as appropriate for children age 2-8 (Figure 11).

Overall results indicate some very revealing patterns. First, it is important to note that for all types of technologies discussed less than or equal to 20% of ECE and IDT professionals judged that technology as appropriate for the use of children ages 2-8. With regard to basic computer functioning, a greater percentage of ECE professionals judged that technologies were appropriate for children. With regard to technology most typically geared toward entertainment, a greater percentage of IDT professionals judged that such technologies were appropriate for children. Finally, with regard to technology most typically geared toward social aspects, a greater percentage of IDT professionals judged that such technologies were appropriate for children.

Discussion

The first point of interest is the response rate from this study. The IDT professionals had a higher rate of response than the ECE participants in the initial response which was adjusted by random sampling of IDT responses. This may be an indication of a different level of technology comfort between the two groups. The response rate difference may also be an indication of limited use of technology with the ECE professionals. Another possible influence on the discrepancy between participants may be the nature of the career choice in which IDT requires technology use as a professional competency. The field of ECE has been resistive to technology use professionally as it is often viewed as oppositional to the underlying theoretical basis for educational environments of young children.

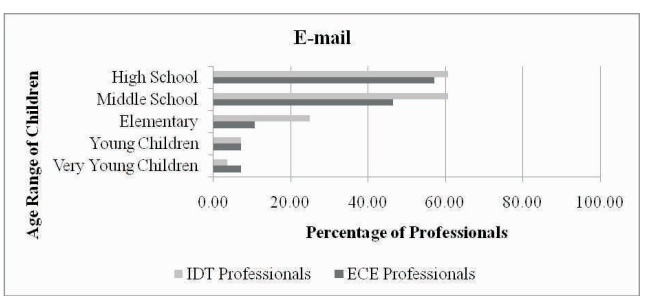


Figure 11. Percentage of ECE and IDT professionals who indicated that e-mail was appropriate for children

Overall the IDT professionals indicate that younger children should use the specified technologies at an earlier age than the ECE participants. This again may be related to a comfort or skill level. Another possible explanation is the ECE participants are acculturated in their theoretical perceptions of Piagetian development and this thinking influences technology use in the classroom. Most of these technologies were not commonly available in the era of Piaget and consequently an unknown influence on children and development at that time. However these technologies are commonly accepted in our era and clearly may impact our concept of development and practice in ECE environments.

The information about Social Networking is another interesting point in light of the strong focus placed on social development and interactions in ECE classrooms. There was no support from the ECE professionals for young or very young children to use Web 2.0 resources for social networking. There were a small percentage of these professionals supporting elementary age children's use of social networking. Yet their professional organizations identify social development as a major part of early childhood programs. The understanding for social development may be changing as more young children participate in social networking. This is also of interest considering the growing number of Web 2.0 social networking sites like www.schooltogethernow.com and togetherville.com developed for younger children. The website www.schooltogethernow.com went live in December 2010 and it is receiving more than 1,000 hits a day from across the country. Already 57 per cent of registered members are children, mostly in the 7 to 11 age bracket. Social networking has become an acceptable form of interaction across the globe and needs to be investigated in relation to social expectations and development in ECE environments.

The data relating to Internet role-playing and simulation indicate that both IDT and ECE professionals have limited support for this technology for Y and VY children when internet based. However the use of CD-based role play with

young children had more support from both groups with a higher level from the IDT group. This is of interest because programs for young children have long supported role play in classrooms. There may be a connection to "pretend" play and these types of programs as both encourage imaginative interactions and creative thinking. The concepts of pretend play, whether in real classrooms or through technology simulations are clearly related as a process. This raises two questions about the use and acceptance of technology when it supports an accepted practice in educational environments. How would the addition of technology change the context of pretend play in ECE environments? Why is technology-based role play considered more acceptable than internet simulations?

Cameras, both digital still and video were mixed with a higher level of support for use by young children by IDT professionals but a higher level of support for these technologies with very young children by ECE participants. This again is of interest as many ECE programs use both tools almost daily to record activities in schools to prepare accreditation materials for professional organizations. These tools evolved from popular well accepted technologies and are used by teachers in their home environments which may support a higher comfort or acceptance level.

Technology primarily associated with entertainment like IPOD/MP3players and television dependent video games were supported at a higher percentage by IDT professionals for VYC but changed to a higher level of ECE support with young children. Television dependent games were more highly supported for both age ranges by the IDT group. This may relate to the idea that the school environment should focus on academics not entertainment. However this thinking is in conflict to the "school should be fun" environments commonly found in ECE programs. Music has long been accepted in these programs and is often considered a teaching tool for basic concepts. The use of games for teaching and social interaction has a long history in these programs. It is unclear why it is perceived that the addition of technology changes accepted teaching approaches.

The conflicting and confirming views of technology with young and very young children by ECE professionals is indeed interesting in light of the similarities between existing approaches to teaching which could be supported through the identified technologies. Professionals in technology clearly support the selected tools for young children yet there is a lower level of acceptance among the ECE participants. ECE professionals seem more confident and accepting of technology tools that have adapted from existing technologies like the telephone. Internet based tools are less supported than similar programs delivered through CDs or stand alone software. This may relate to perceptions of power and control in educational environments, long associated with the idea that teachers are omnipresent keepers of knowledge. CDs or stand alone software can be controlled by teachers while the internet brings a possibility of student selection of learning.

IDT professionals support the use of technology with young and very young children. This may be because of their confidence and competence levels. However it is unlikely this group would support tools that might damage young children. These are the professionals who have more experience with technology and have a clearly understanding of the potential for applications in educational environments. They are also the connectors between what is happening in the socio-cultural environment and education.

Figure 12 from the survey reveals more insight into how the ECE professionals disconnect technology from their personal use and their educational applications. This was in the demographic part of the survey and is included in the discussion section because the authors think this gives insight into some information about how these professionals view the role of technology in their educational environments. The ECE group uses technology

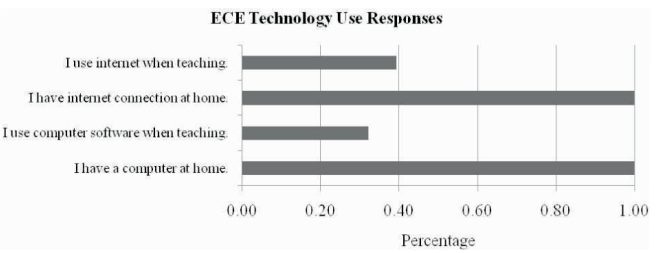


Figure 12. ECE professionals home versus school

at home but do not transfer this into the classroom. This missing link may be helping these teachers adapt their personal experiences to the educational environment.

Conclusion

Clearly professionals in the field of IDT have a high level of interest in technology and it would be unusual for them to not support technology use. Beyond their career choice this group may have a better understanding of the types of technology that are accepted and used in the socio-cultural environment of any community. The acceptance of technology in informal settings influences experiences and development of young children. Professionals in the field of ECE come to their careers with training and study of child development as perceived by their trainers and university faculty. ECE teachers and training programs depend on the university faculty that develop these programs and the interpretation of the information in programs by students and practitioners. Because ECE faculty come from the same career pool as practitioners it is possible that many of the issues identified with practitioners are encouraged and supported at the university level. Is it established that these students come to classrooms with pre- and misconceptions about technology. This can either be supported or repaired by experience in Colleges of Education (Donovan, & Bransford, 2005). The information in this study supports the need for revisions in teacher training programs with new thinking about DAP.

It is estimated that there are three quarters of a million underage social networking children users in the UK alone (Callow, 2008. A report from AVG Security indicates that 7% of babies and toddlers have their own email address, 5% have their own social networking account and 81% of children under 2 have a digital footprint. The socio-cultural environment of the current population supports technology use by younger children. There may be a conflict between the general population and ECE educational environments in relation to acceptance of technology. Children will enter ECE programs with an environmental acceptance of technology and socio-cultural experiences related to technology. Professionals in the field of early childhood education clearly need to rethink what the expectations and meaning of developmentally appropriate practice means in the digital age.

References

[1]. Buehl, M. M. & Alexander, P. A. (2005). Motivation and performance differences among domain-specific epistemological belief clusters. *American Educational Research Journal, 42,* 697-726.

[2]. Burman, E. (1994). Therapy as Memory-Work: Dilemmas of Discovery, Recovery, and Construction. *British Journal of Psychotherapy,* Volume. 18, Issue 4, pp. 457 – 469.

[3]. Callow, R. (2008). *When is it too early for kids to have a social network account?* Retrieved from http://econsultancy.com/us/press-releases/5210-welcome-to-the-online-world-quarter-of-children-have-online-births-before-their-real-ones.

[4]. Cannella, G.S. (1997). *Deconstructing Early Childhood Education: Social Justice & Revolution.* New York: Peter Lang.

[5]. Cordes, C., & Miller, E. (1999). *Fool's gold: A critical look at computers in childhood.* College Park, MD: Alliance for Childhood.

[6]. Donovan, M.S. & Bransford, J.D. (2005). *How Students Learn*. National Research Council.

[7]. Duell, O. K., & Schommer-Aikins, M. (2001). Measures of people's beliefs about knowledge and learning. *Educational Psychology Review,* 13, 419-449.

[8]. Flavell, J. H., & Miller, P. H. (1998). Social cognition. In W. Damon (Series Ed.), D. Kuhn & R. S. Siegler (Eds.), *Handbook of child psychology: Vol. 2. Cognition, perception, and language* (5th ed., pp. 851–898). New York: Wiley.

[9]. Grieshaber, S. (2005). Shifting from developmental to postmodern practices in early childhood teacher education. *Journal of Teacher Education, 56*(1), 34-45.

[10]. Hofer, B. K., & Pintrich, P. R. (Eds.) (2002). *Personal epistemology: The psychology of beliefs about knowledge and knowing*. Mahwah, NJ: Erlbaum.

[11]. Hofer, B. K. (2001). Personal epistemology research: Implications for Learning and Teaching. *Journal of Educational Psychology Review,* 13, 353-383.

[12]. Hofer, B. K. (2000). Dimensionality and disciplinary

differences in personal epistemology. *Contemporary Educational Psychology*, *25*, 378-405.

[13]. Lee, K., & Johnson, A. S. (2007). Child development in cultural contexts: Implications of cultural psychology for early childhood teacher education. *Early Childhood Education Journal,* 35(3), 233-243.

[14]. National Academies Press (2008). Committee on Prospering in the Global Economy of the 21st Century: An Agenda for American Science and Technology, Committee on Science, Engineering, and Public Policy, National Academy of Sciences, National Academy of Engineering, & Institute of Medicine. *Rising above the gathering storm: Energizing and employing America for a brighter economic future*. Washington, DC: The National Academies Press.

[15]. National Research Council (2000). From neurons to neighborhoods: The science of early childhood development. Committee on Integrating Science of Early Childhood Development, J.P. Shonkoff and D.A. Phillips (Ed.s). *Board on Children, Youth, and Families, Commission on Behavioral and Social Science and Education.* Washington, DC: National Academy Press.

[16]. National Research Council. (2001). Adding IDT up: Helping children learn mathematics. Mathematics Learning Study Committee. J. Kilpatrick, J. Swafford, and B. Findell (Eds.) *Center for Education, Division of Behavioral and Social Sciences and Education.* Washington, D.C: National Academy Press.

[17]. National Research Council (2001). Eager to learn: Educating out preschooler. Committee on Early Childhood Pedagogy. B.T. Bowman, M.S. Donovan, and M.S. Burns (Eds.). *Commission on Behavioral and Social Science Education.* Washington, DC: National Academy Press.

[18]. National Center for Education Statistics :NCES (2003). *Young Children's Access to Computers in the Home and at School in 1999 and 2000*. Washington, DC: Retrieved from http://nces.ed.gov/pubs2003/2003036.pdf.

[19]. National Research Council (2005). *Mathematical and scientific development in early childhood.* Washington, DC: The National Academies Press.

[20]. National Research Council. (2008). Committee on Prospering in the Global Economy of the 21st Century: An Agenda for American Science and Technology, Committee on Science, Engineering, and Public Policy, National Academy of Sciences, National Academy of Engineering, & Institute of Medicine. *Rising above the gathering storm: Energizing and employing America for a brighter economic future.* Washington, DC: The National Academies Press.

[21]. Papert S. (2000). *From Lunch Boxes to Laptops:* The Governor King Initiative, www.papert.org/articles/laptops/laptops_master.html.

[22]. Renzulli, J.S. (2007). The Renzulli learning system: Assessing and developing children's interest. Duke Gifted Letter for Parents of Gifted Children. 7(3) *Spring.*

[23]. Spatariu, A., Peach, A. & Bell, S. (In press). Enculturation of Young Children and Technology. In Blake, Winsor & Allen (Eds). *Technology and young children: Bridging the digital communication-generation gap.* Hershey, PA: IGI Global.

[24]. Wellman, H.M., Cross, D. & Watson, J. (2001). A meta-analysis of theory of mind development: The truth about false belief. *Child Development*, 72,655-684.

[25]. Winsor, D. L. (2006). Inter-relatedness of theory of mind and epistemology in young children. Paper presented in F.C. Haerle (Chair), *Measuring Children's Personal Epistemology and Its Relevance for Education*. Symposium conducted at the American Educational Research Association Annual Meeting, San Francisco, CA, USA.

Appendix A

IDT Survey Questions

The purpose of this survey is to gather information about the beliefs and experiences of Instructional Design & Technology (IDT) Professionals concerning technology use with young children and teachers of young children. For the purpose of this survey, Young Children (YC) are considered those ages 5-8; Very Young Children (VYC) are considered those ages 2-4. All responses are voluntary and anonymous.

1. What is your current status as an IDT professional?

☐ Higher Ed. Faculty/Instructor ☐ PK-12 Teacher ☐ Private Sector/Corporate (trainer, designer, coordinator) ☐ Public Sector/Government (trainer, designer, coordinator) ☐ Software Designer/Developer ☐ IDT Consultant ☐ Other

If Other, please specify:

2. Please indicate your gender and age range:

☐ Male ☐ Female ☐ 20-30 yrs. ☐ 31-40 yrs. ☐ 41-50 yrs. ☐ 51-60 yrs. ☐ Over 60

3. Please indicate in which content area/field did you earn your academic degree:

☐ Education ☐ Computer Science ☐ Psychology ☐ Engineering ☐ Sciences (e.g. Physics, Biology) ☐ Mathematics ☐ Other

If Other, please specify:

Please indicate your thinking on the appropriate ages for children to use various technologies. The choices are: Very Young Children (Ages 2-4); Young Children (Ages 5-8); Elementary (Ages 9-12); Middle School (Ages 13-15); and High School (15 and over).

12. Within what age group do you think children should be allowed to use the following forms of technology? (We realize that some of these categories may be somewhat indistinct due to emerging technologies)

	Very Young Children	Young Children	Elementary	Middle School	High School
Computers w/standalone software programs/CDs	☐	☐	☐	☐	☐
Computers w/Internet-based/online programs	☐	☐	☐	☐	☐
Computer-based Games (standalone, CD-based)	☐	☐	☐	☐	☐
Internet-accessible Games (Halo, World of Warcraft, etc.)	☐	☐	☐	☐	☐
Hand-held Video Games (Nintendo, etc.)	☐	☐	☐	☐	☐
TV-dependent Video Games (Nintendo, XBox, PlayStation, etc.)	☐	☐	☐	☐	☐
CD-based Role-playing/Simulation (Civilization, Sims, etc.)	☐	☐	☐	☐	☐
Internet Role-playing/Simulation (2nd Life, Virtual Worlds, etc.)	☐	☐	☐	☐	☐
Web 2.0/Social Networking (Facebook, YouTube, Twitter, MySpace, Flickr, etc.)	☐	☐	☐	☐	☐
iPod/MP3 Player	☐	☐	☐	☐	☐
Digital Still Cameras	☐	☐	☐	☐	☐
Digital Video Cameras	☐	☐	☐	☐	☐
Cell Phones	☐	☐	☐	☐	☐
E-mail	☐	☐	☐	☐	☐

Comments:

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